

TVA Transmission Highlights

TVA is the largest public-power provider in the country, maintaining a 31,517-megawatt power system to provide power to large industries and distributors that serve over 8.3 million residential, commercial, and industrial customers in parts of seven states.

The TVA transmission system is one of the largest and most reliable systems in North America, maintaining 99.999 percent reliability over the last three years in delivering electricity to customers. This system is comprised of about 17,000 miles of transmission lines and 120,000 transmission-line structures with 984 individual interchange and interconnection points, occupying over 240,000 right-of-way acres, and spanning TVA's 80,000-square-mile service area.

TVA's power system met its all-time second highest summer peak power demand, 29,052 megawatts, on August 5, 2002. TVA's transmission system served this regional demand while also handling imports, exports, and power moving across the TVA system. Subsequently, TVA met an all-time record peak power demand of 29,866 megawatts on January 24, 2003, when the average Valley temperature was six degrees Fahrenheit.

TVA Transmission System Firsts

TVA's transmission system is not only one of the largest in the nation, it is also one of the most innovative. As a public service corporation seeking to provide affordable, reliable power, TVA works to find ways to make its power system more efficient and productive. TVA has been the first to incorporate some major innovations, including:

- TVA's transmission system was the first in North America to widely adopt 500-kilovolts (kV) as a transmission line-voltage. These lines are capable of carrying very large power loads. TVA now has over 2,000 miles of 500-kV lines.
- TVA was the first company to build major interconnections with surrounding utilities for seasonal diversity power exchanges and reliability. Under these arrangements, utilities exchange power at different times of the year to take advantage of lower prices, largely caused by differing seasonal load factors related to consumers' heating and cooling patterns.
- TVA's transmission system is the first to use large-scale, second-generation Flexible Alternating Current Transmission System (FACTS) devices. These devices can increase the capacity of individual transmission corridors by up to 80 percent. With their use, TVA has been able to increase power flow into areas of high load growth without building new lines.

TVA Transmission System Facts:

- **TVA has reduced the frequency of customer interruptions by 45 percent over the past seven years.**
- **In the last three years, the average duration of outages to all customers has been cut in half.**
- **The installation of over 100 lightning-mitigation projects has helped reduce the number of system outages by over 30 percent since 1995.**

- TVA has the first commercially -installed Static Synchronous Compensator (STATCOM) device in the country, resulting from a partnership with the Electric Power Research Institute (EPRI) and Siemens. The unit began operation in 1995 and allowed TVA to postpone construction of an additional 161-kV line and the installation of a 500-kV tap-changing transformer bank.
- TVA plans to be among the first to use the American Superconductor Corporation's SuperVAR technology to help meet the growing demand for reliable power. SuperVARs are designed to provide reactive power needed to maintain stable voltage levels. Installation of the SuperVAR synchronous condenser prototype at a substation on the TVA grid will offer a real-world environment to demonstrate the effectiveness of SuperVAR machines.
- TVA, in partnership with Vanderbilt University, is exploring the use of commercial-grade diamonds in thyristors and other applications. Thyristor valves, originally developed in the 1970s, helped reduce the considerable size of DC-converter stations. If successful, TVA will be the first company to move from silicon to diamonds for power electronics. TVA expects this technology to carry 10 times more current, conduct heat four times better than copper, carry 10 to 30 times more DC voltage, and operate at much higher frequencies than conventional devices.

Measures of Reliability

One of TVA's six strategic objectives is to meet customers' needs by providing affordable, reliable electric power. TVA's transmission system is a key component in meeting this objective. In 2002, TVA sold over 160 billion kilowatt-hours of electricity. Realizing that transmission capability is critical in keeping up with growing demand in the TVA region, TVA continued to invest in its transmission system in 2002, installing over 100 miles of new transmission lines and 32 new individual interchange and connection points. These and other investments helped TVA maintain 99.999 percent transmission reliability in 2002.

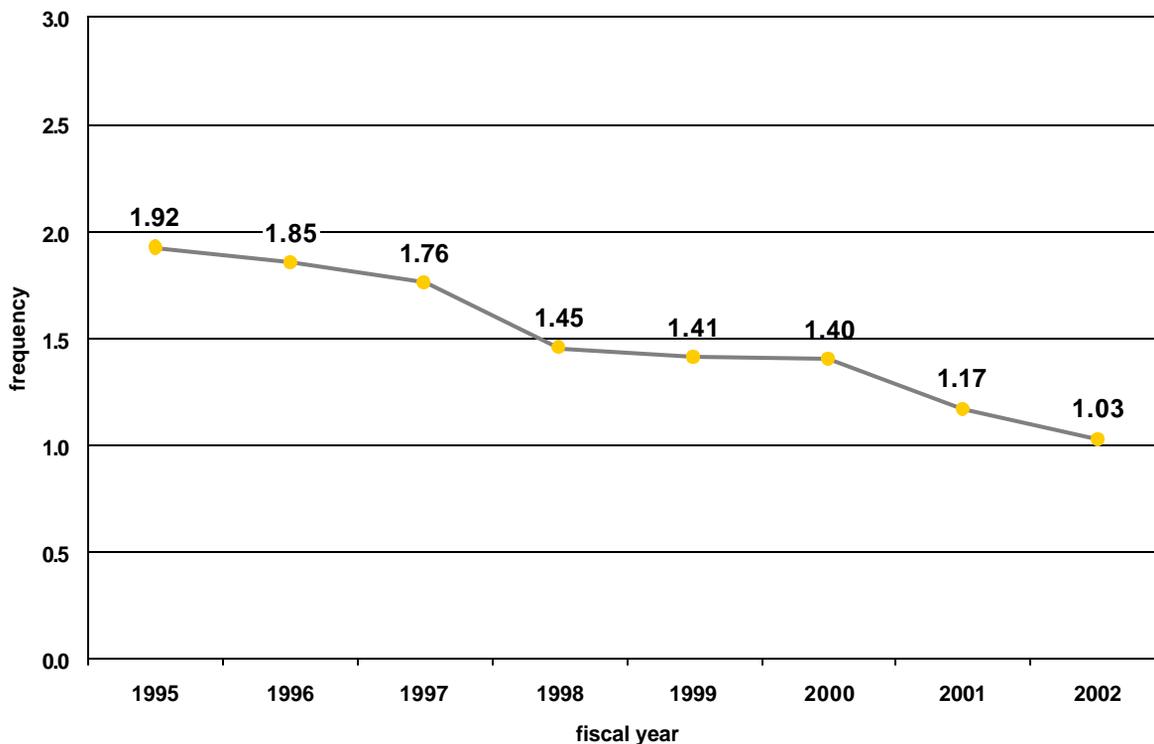


One metric that TVA uses to measure reliability is the frequency of Customer Connection Point Interruptions (CCPI). CCPI is a measure of reliability from the customer's perspective. It includes any power interruption, even momentary interruptions, that can be very costly to those industries whose processes are highly sensitive to outages of any duration. CCPI is calculated by dividing the number of interruptions in a given period of time by the number of connection points in a transmission system.

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Customer interruptions are driven primarily by weather, and it can be particularly difficult to reduce the number of interruptions across large transmission systems such as TVA's, with thousands of miles of lines crossing rural areas. Nevertheless, TVA reduced CCPI for the seventh straight year in 2002 to 1.03, surpassing performance targets for the year and reducing the frequency of customer interruptions by over 45 percent since 1995.

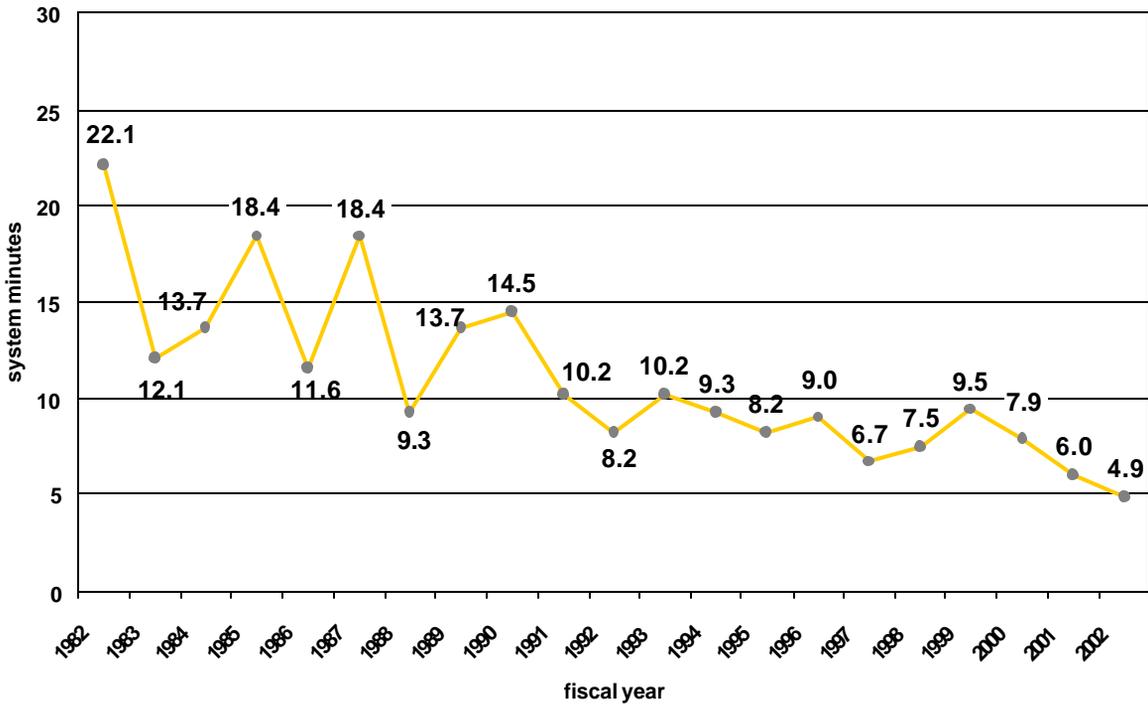
Customer Connection Point Interruptions (CCPI)



Another measure of reliability is Load Not Served (LNS), which measures the magnitude and duration of interruptions in average system minutes. LNS is calculated by multiplying the percentage of total load not served (in megawatt-hours) by the number of minutes in the fiscal year. This indicator can be greatly affected by the time it takes to recover from ice storms, lightning, tornadoes, and other forces of nature. TVA's LNS is approximately three times better than the average of those utilities participating in benchmark activities with TVA.

In fact, TVA reduced LNS to just under five system minutes in 2002. By comparison, LNS in 1982 was over 22 system minutes. In just the past three years, LNS has been reduced by almost half. TVA is taking proactive steps to drive LNS even lower, such as identifying equipment that is nearing the end of its service life and replacing it before failure.

Load Not Served (LNS)



TVA Transmission System Accomplishments:

- TVA had adequate generation to supply 100 percent of its firm load during the 2001-2002 peak winter demand period. This resulted from sound planning, excellent performance of TVA’s transmission system and diverse generating assets, and an array of purchased power options.

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- TVA continued to benefit from the TVA Integrated Operations Team's fully automated process redesign in 2002. TVA's Integrated Operations Team won the Rochester Institute of Technology/USA TODAY Quality Cup in May 2001, for this fully-automated process redesign. The team helped reduce from 47 minutes to four minutes the time it takes to re-optimize supply when there are unexpected changes on the system. This process optimized the overall performance of the power system and will help save over \$30 million per year. The team's models are helping TVA achieve the lowest rate of customer-connection-point interruptions in its history.



- TVA has reduced the frequency of transmission customer interruptions by 45 percent since 1995, placing frequency of interruptions at the lowest levels in TVA history. The impact of lightning strikes on TVA's transmission system, the single-largest cause of transmission outages in the TVA region, has been reduced by investing almost \$13 million in over 100 lightning-mitigation projects. These projects have helped reduce customer outages caused by lightning by 30 percent since 1995.
- TVA has invested almost \$9 million for capacitor banks to maintain voltage levels when power from sources outside TVA loops through the TVA system (which could degrade system levels).
- TVA met 100 percent of its in-service-date targets for new customer delivery points in 2002.
- TVA Transmission/Power Supply (TPS) group employees demonstrated their commitment to excellence by achieving best-in-class performance in lost-time incidence rate. TPS reached unprecedented milestones of four million safe workhours in April of 2002 and five million safe workhours in August 2002, and continued to make TVA history.

